

From the
INTERNATIONAL SEARCHING AUTHORITY

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/B2004/051003

International filing date (day/month/year)
24.06.2004

Priority date (day/month/year)
27.06.2003

International Patent Classification (IPC) or both national classification and IPC
H03M3/02

Applicant
KONINKLIJKE PHILIPS ELECTRONICS N.V.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 b/s(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/B2004/051003

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and Industrial
applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
- ☒ claims Nos. 5-8,10-11

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 5-8,10-11 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the whole application or for said claims Nos.
- ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
 - the written form ☐ has not been furnished
 - ☐ does not comply with the standard
 - the computer readable form ☐ has not been furnished
 - ☐ does not comply with the standard
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
- ☐ See separate sheet for further details

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**WRITTEN OPINION OF THE
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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ not paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
 - ☐ the parts relating to claims Nos.

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-4,13-14
	No: Claims	1,9,12
Inventive step (IS)	Yes: Claims	
	No: Claims	1-4,9,12-14
Industrial applicability (IA)	Yes: Claims	1-4,9,12-14
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item III

1. The application does not meet the requirements of Article 6 PCT, because the current set of claims is not clear.
 - (a) Expressions such as "substantially frequency-independent" in claims 2, line 16, claim 6, lines 21-22, claim 7, second page, line 5, and claims 4 and 8 are vague and leave the reader in doubt as to the exact scope of the feature (PCT International Preliminary Examination Guidelines, Section IV, III-4.5 and 4.5a). Moreover, these expressions appear to be inaccurate and contradict the description and claim 11, which specifies, that the "transfer function ... is constant within the loop bandwidth of the converter".
 - (b) Dependent claim 13 (see lines 16-18) defines a result which is to be achieved with the present application (see PCT International Preliminary Examination Guidelines III-4.7).
 - (c) The dependency of claim 13 is unclear. This claim refers back to claim 12 and is, therefore, always dependent on claim 1. The expression "in as far as dependent on" in claims 13 and 14 is also considered unclear.
 - (d) The formulations in claim 3 "means to cascade ...", "means to couple ...", etc. seem to imply that the specified elements can be cascaded or coupled in one or more modes of operation and that the elements are not cascaded or not coupled in another mode of operation. The circuit is, however, fixed (see drawings). In contrast, the respective specification in claim 7 is considered clear.
 - (e) The definition of claims 3, 5, 7 and 11 is not concise. These claims repeat several features of claim 1 (e.g. summing node C_3 in claim 3). The claims are also unclear, because they do not clearly define, whether the elements are additional elements or the same elements that were already specified in claim 1.
 - (f) The specification that a filter may be only an interconnection (see page 8, line 17) cannot be accepted and renders the application as a whole unclear. According to the common understanding in the technical area a filter provides an output signal, which differs in some characteristic and for at least a certain frequency range with respect to the input signal. This is not the case for an interconnection.
 - (g) It is apparent from the description (see page 8) and the drawing corresponding to this embodiment (Fig.3) that the fact that $F3 \gg 1$ is essential to the performance of the invention.

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Since the dependent claim 5 does not contain this feature the present application does not meet the requirement of Article 6 PCT.

The description and Fig.3 only shows embodiments, in which the first summing node C_3 receives the same signal as the second filter F2. This feature is likewise essential to the invention, because otherwise the filtering signal transfer function will not be the one specified in claim 5.

The same objections apply mutatis mutandis for claims 6-11.

The subject-matter of claims 5-8 and 10-11 is so unclear that at present no opinion on novelty or inventive step can be given.

Re Item IV

1. The following documents are referred to in this Written Opinion of the International Search Authority:

D1: EP-A-0 586 021 (ANALOG DEVICES INC) 9 March 1994 (1994-03-09)
D2: FERGUSON JR P F ET AL: "ONE BIT HIGHER ORDER SIGMA-DELTA A/D CONVERTERS" PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS. NEW ORLEANS, MAY 1 - 3, 1990, NEW YORK, IEEE, US, vol. VOL. 2 CONF. 23, 1 May 1990 (1990-05-01), pages 890-893, XP000166962
D3: TOSHIYUKI OKAMOTO ET AL: "A STABLE HIGH-ORDER DELTA-SIGMA MODULATOR WITH AN FIR SPECTRUM DISTRIBUTOR" IEEE JOURNAL OF SOLID-STATE CIRCUITS, IEEE INC. NEW YORK, US, vol. 28, no. 7, 1 July 1993 (1993-07-01), pages 730-734, XP000322301 ISSN: 0018-9200
D4: US-A-5 241 310 (TIEMANN JEROME J) 31 August 1993 (1993-08-31)
D5: US 2002/105449 A1 (SINGER LAWRENCE ET AL) 8 August 2002 (2002-08-08)
D6: SHENGPING YANG ET AL: "A tunable bandpass sigma-delta A/D conversion for mobile communication receiver" VEHICULAR TECHNOLOGY CONFERENCE, 1994 IEEE 44TH STOCKHOLM, SWEDEN 8-10 JUNE 1994, NEW YORK, NY, USA, IEEE, 8 June 1994 (1994-06-08), pages 1346-1350, XP010123297 ISBN: 0-7803-1927-3
2. The present application lacks unity within the meaning of Rule 13.1 PCT because 2 different inventions are claimed therein which are defined by the following groups of

claims:

I. Claims 1-8 and 10-14 refer to a sigma-delta A/D converter with filters in feedback and feedforward path, that are adapted to provide a frequency-independent transfer function for the input signal in the passband.

II. Claims 1,9 refer to a sigma-delta A/D-converter comprising gain controlled stages in the feedback path or feedforward path.

3. According to Article 34 (3) (a) PCT with Rule 13.1 PCT claims directed to different subject matter may be included in one and the same international patent application only if they are linked by a single, general inventive concept.

4. According to Rule 13.1 PCT the requirement of unity of invention shall be fulfilled only when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical feature" shall mean those features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.
The independent claim 1 is apparently not new (see reasoning under point V, 2.1 below).

Moreover, the features of e.g. dependent claim 3, which appears to represent the first invention are different from the feature of claim 9. The technical problem to reduce the dynamic range of the signals of the A/D-converter (page 3, lines 24-25) is commonly known (see e.g. documents D4 and D5).

5. The Examiner is therefore of the opinion that there is no single, general inventive concept which links the subject matter of the different independent claims. Thus the present application lacks unity within the meaning of Article 34 (3) (a) PCT with Rule 13.1 PCT.

Re Item V

1. As far as the claims can be understood in view of the above mentioned unclarities, the subject-matter of claims 1-4, 9, 12-14 lacks novelty (Article 33(2) PCT) or inventive step, respectively (Article 33(3) PCT).

1.1 D1 discloses all the elements of claim 1, i.e. an ADC (page 2, lines 1-3) including

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a sigma delta modulator (Fig.7). D1 also discloses the feedback loop comprising a summing node (704), the input (700), the noise-shaping filtering means (708), the quantizer (720) and the filtering means in the feedback and feedforward path (712, 708) as specified in claim 1.

Hence, the subject-matter of claim 1 lacks novelty with respect to D1.

- 1.2 The objection with respect to claim 1 applies likewise with respect to documents D2-D3 and D6.
- 1.3 The features of the further claims 3-4 and 12-13 are also shown in the cited documents. In particular, D1 shows that the filtering signal transfer function is "substantially frequency independent" (see D1, Fig.9). The separation of the filter 708 in the feedforward path of the modulator as specified in claim 2 is obvious for the skilled person. Likewise the feature of claim 14 is considered obvious.
- 1.4 Documents D4 and D5 show the feature of claim 9, i.e. gain controlled stages.

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